

Analysis of rolled Cu67-Fe33 samples

- Production: Powder metallurgy (Technical University of Hamburg-Harburg, B. Commentz)
- Cold Isostatic Pressing (115 Mpa)
- Hot Pressing (750°C, 50 Mpa, 30 min)
- Resulting compacts: 1% porosity
- Rolling at 5 m/min
 - I: not deformed
 - II: 6 pass for -0.1/pass, plastic deformation: -0.607
 - III: 6 pass for -0.2/pass, plastic deformation: -1.142
- Measurements by Neutron TOF at IPNS (US) to obtain texture and stresses

Spettri TOF (neutroni) e analisi

2D Multiplot for bank3

measured data and fit

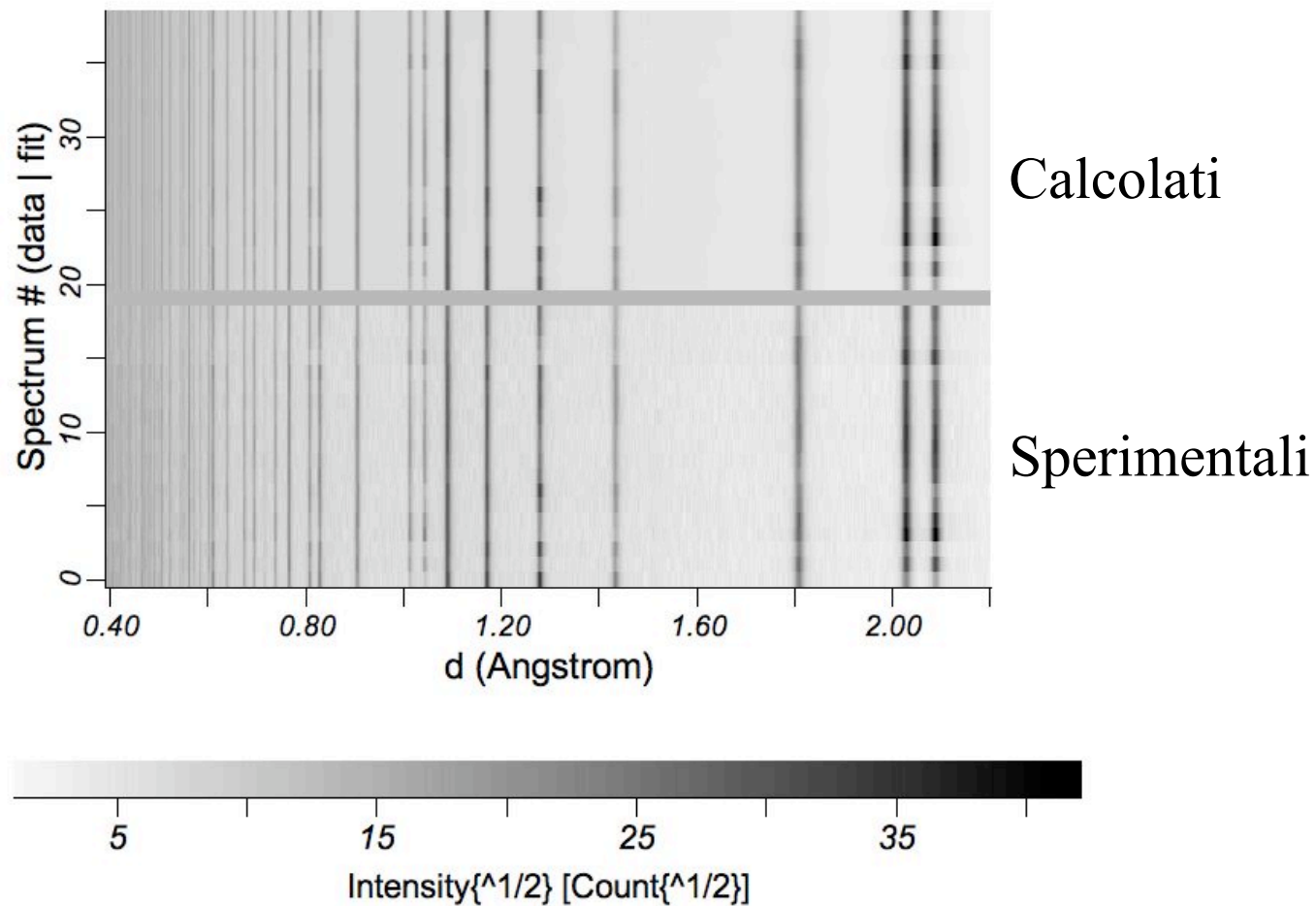
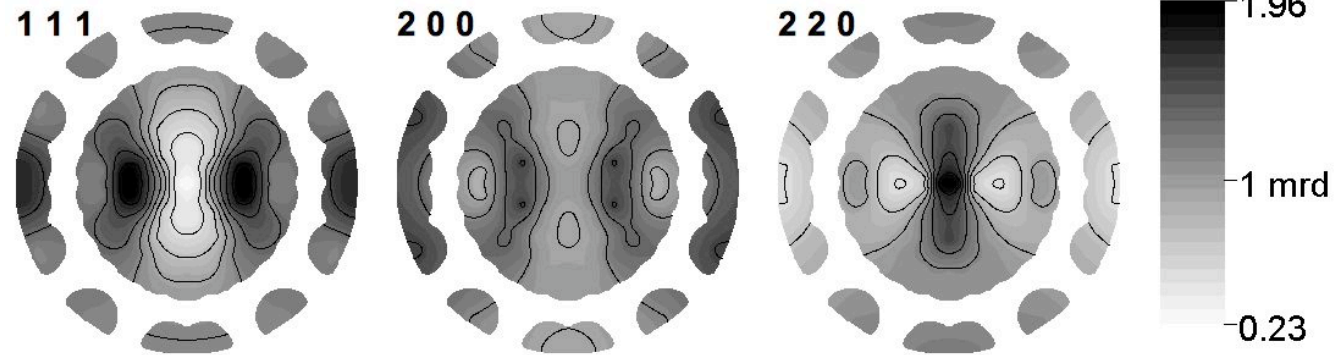


Figure polari (Cu)

Sperimentali



Calcolate

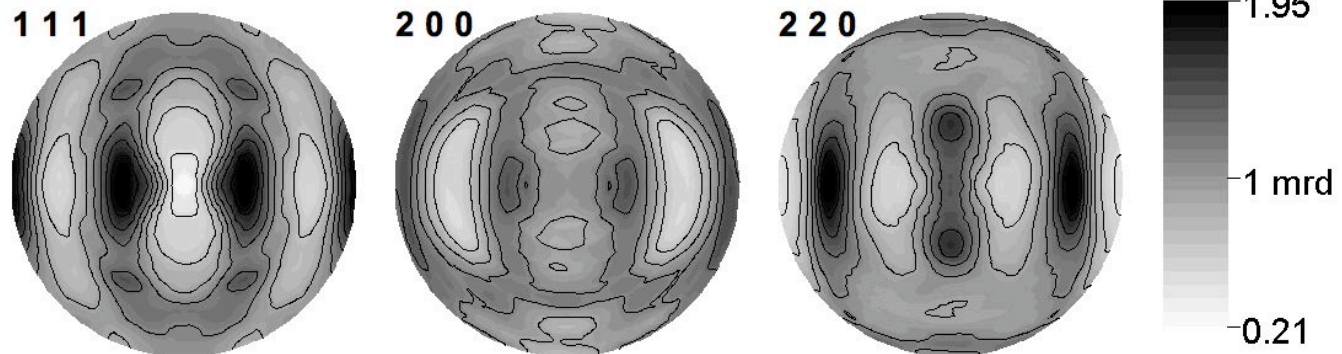
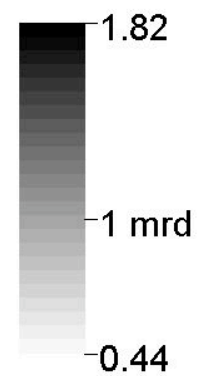
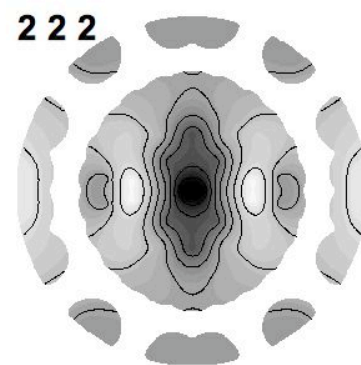
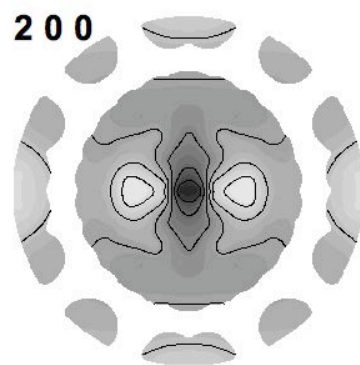
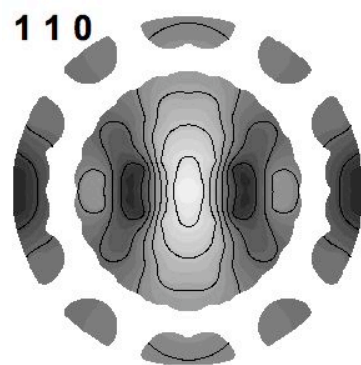
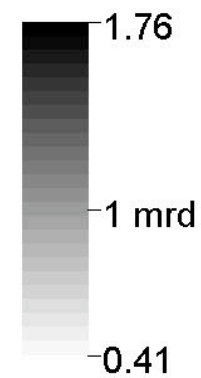
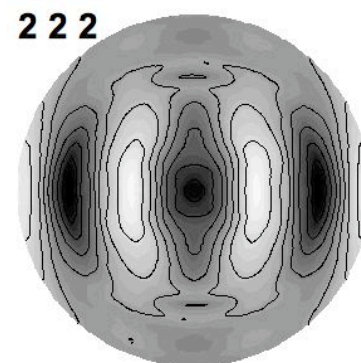
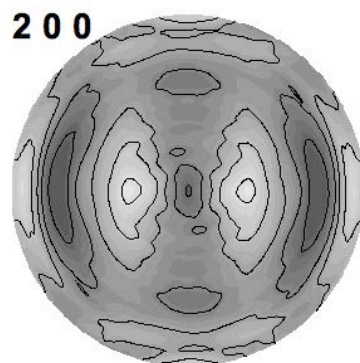
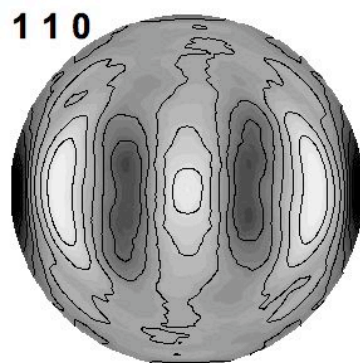


Figure polari Fe

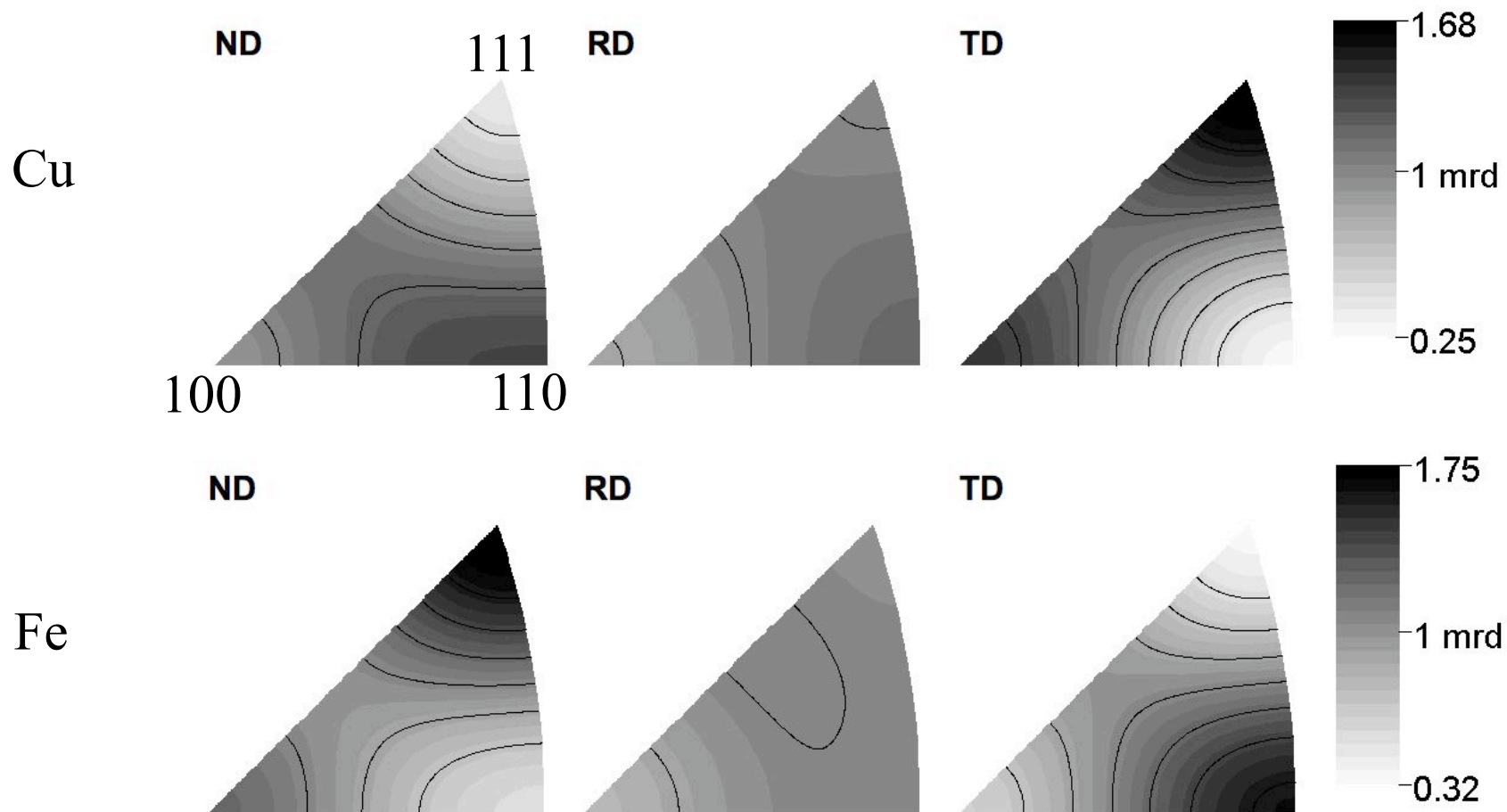
Sperimentali



Calcolate



Confronto Cu - Fe (figure polari inverse)



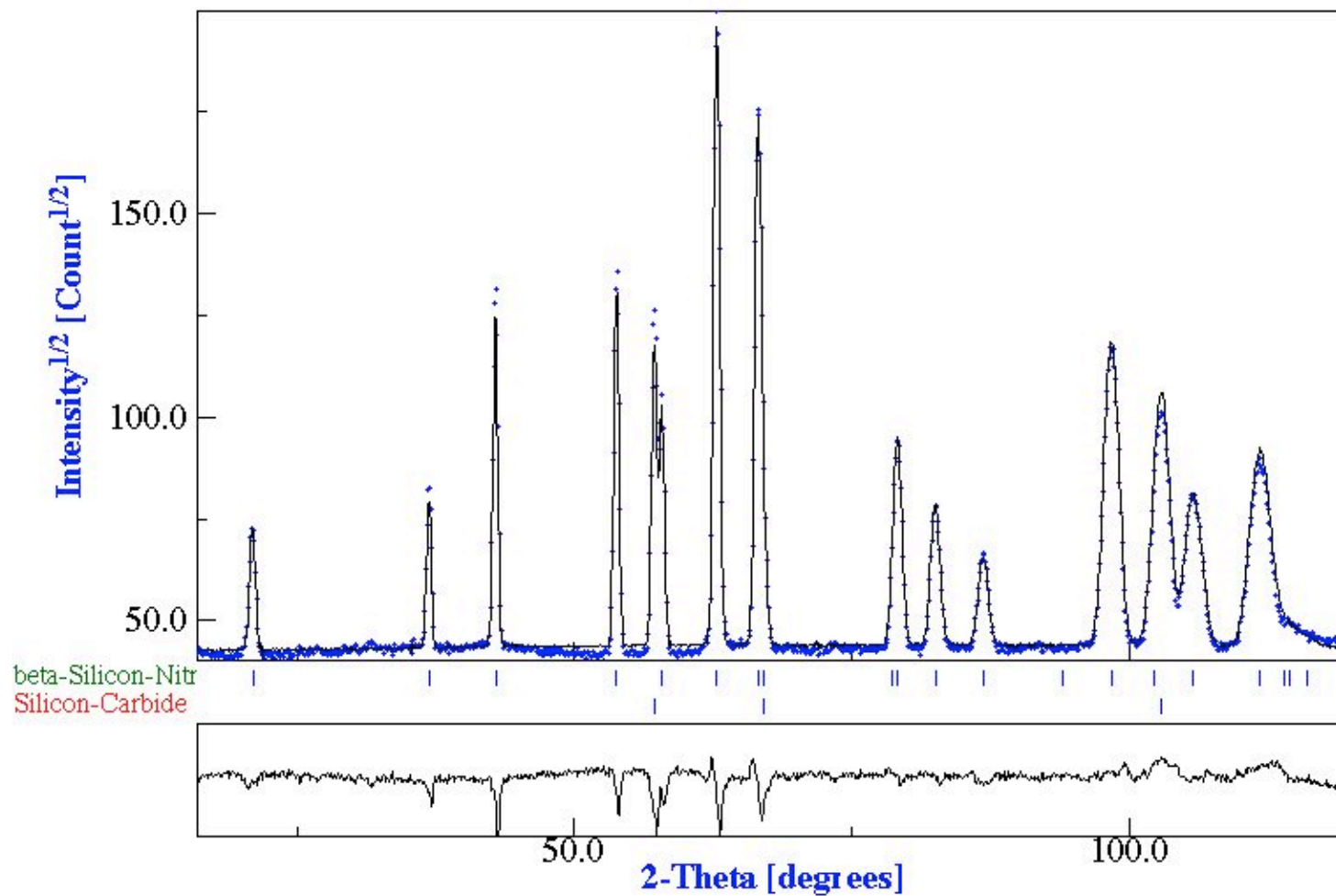
Analysis Results: QPA and stresses

- CuFeII:
 - Cu volume fraction: 68(1) %
 - $\sigma_{\text{Cu}} = 27 \text{ MPa}$
- CuFeIII:
 - Cu volume fraction: 67(1) %
 - $\sigma_{\text{Cu}} = 30 \text{ MPa}$

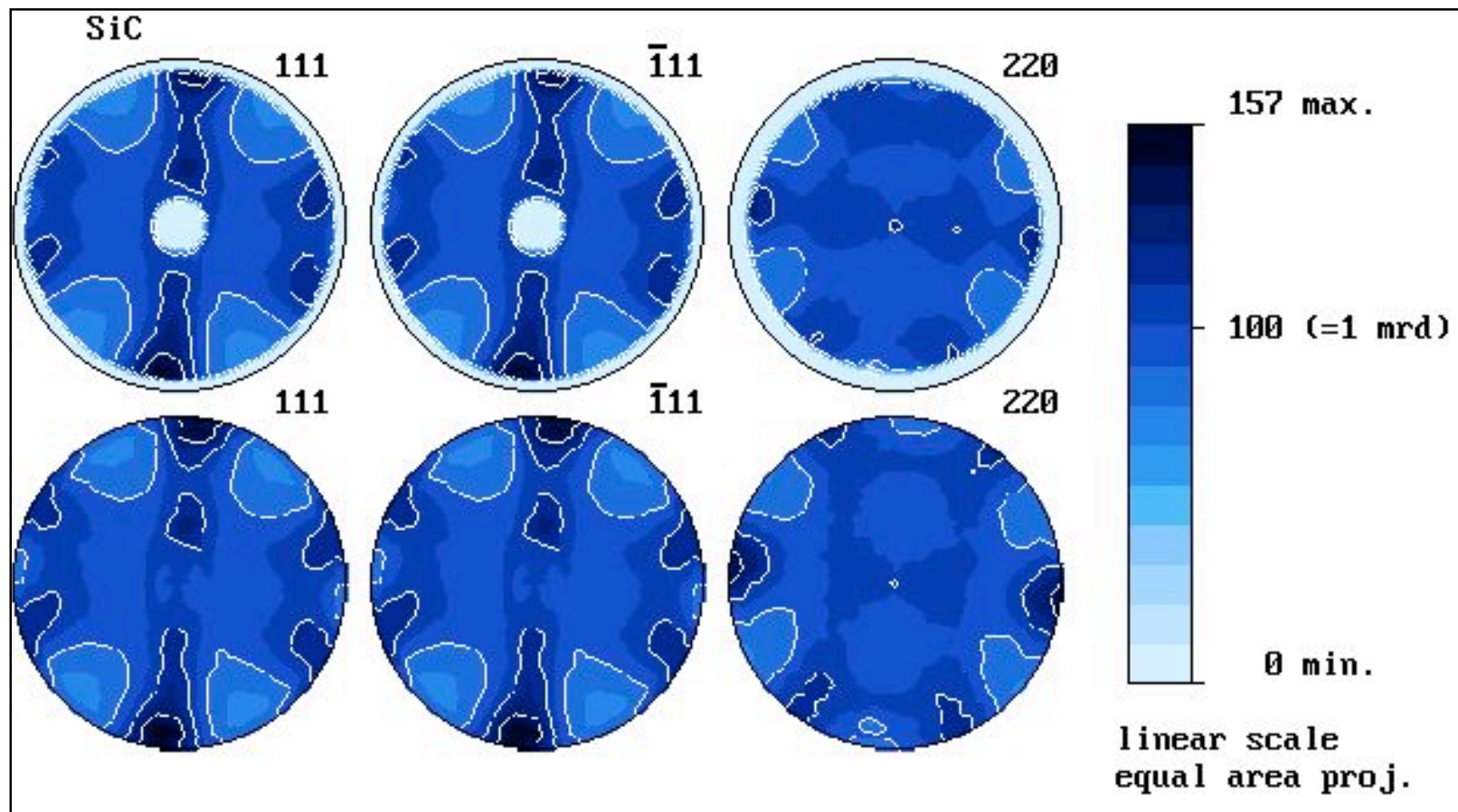
Kryptonite: SiC-Si₃N₄ composites

- ◆ SiC whiskers: (111) along fiber direction
- ◆ Matrix: β -Si₃N₄
- ◆ Minor glass quantity (for sintering aid)
- ◆ Composite obtained by HIP
- ◆ Diffraction measurements:
 - D20-ILL: neutron, PSD, Eulerian cradle
 - ☒ 720 spectra, 10°x10° grid on χ and ϕ , 2 ω positions
- ◆ Analyzed by Maud using RiTA (Rietveld Texture Analysis)

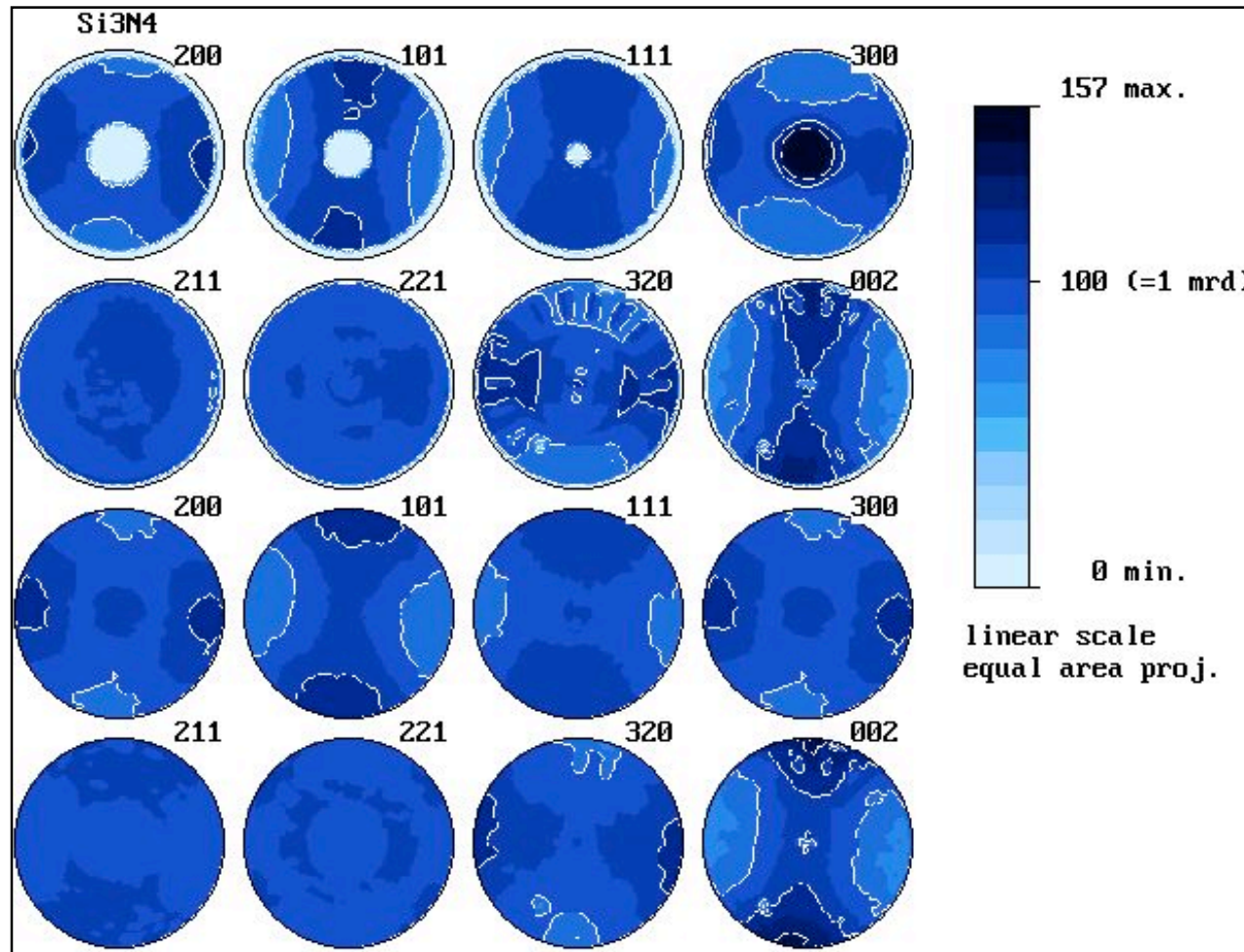
Kryptonite spectrum fitted (selected)



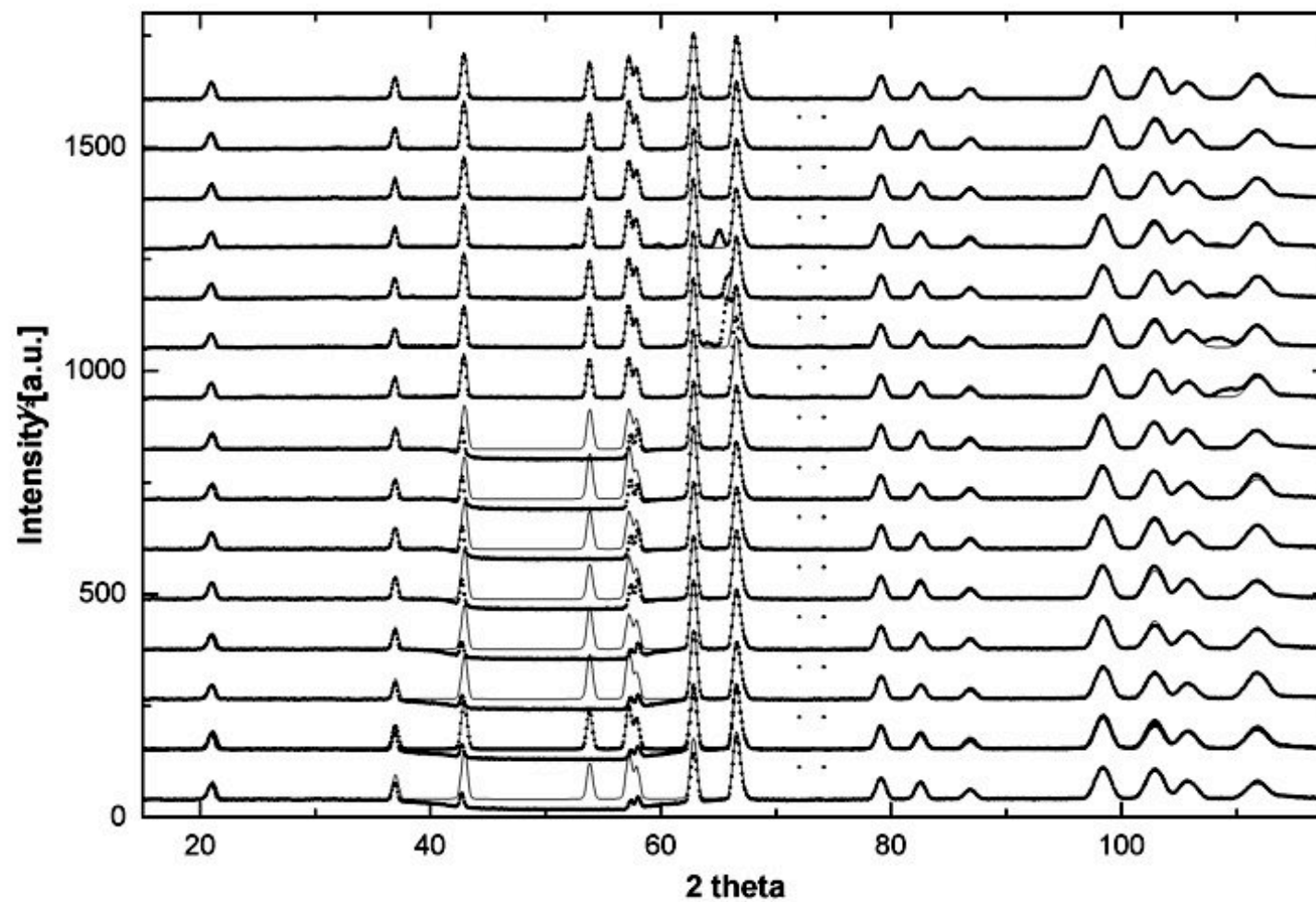
SiC: experimental and reconstructed pole figures



Si₃N₄: experimental and reconstructed pole figures



Kryptonite spectra fitted



Kryptonite results

- ◆ **SiC distributed mainly in the basal plane of the composite**
 - **Optimum in plane mechanical properties of the composites**
- ◆ **β -Si₃N₄ has a random ODF**
- ◆ **SiC volume fraction: 24.2 %**

The metamorphic quartzite

◆ Sample:

- Clast from a metaconglomerate in Wildrose Canyon (Death Valley National Park, California)
- Cylindrical sample, 2 cm diameter for 2 cm long

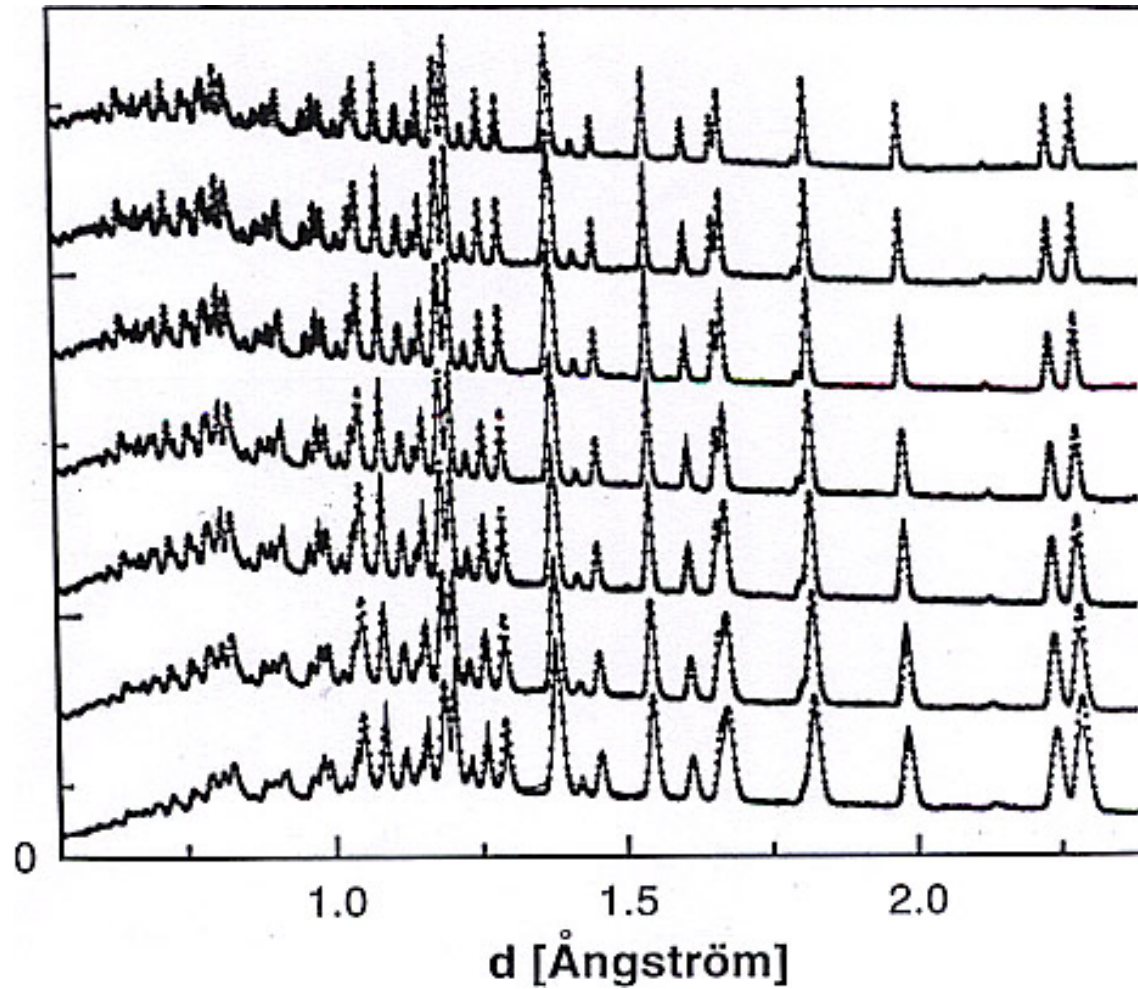
◆ Data collection:

- Neutron TOF at JINR-Dubna (Russia, pulsed reactor IBR-2) (K. Ullmeyer)
- 7 detectors at two different positions and one axis sample rotation lead to 650 spectra at the constant grid resolution of 7.2° (15 minutes for each position).

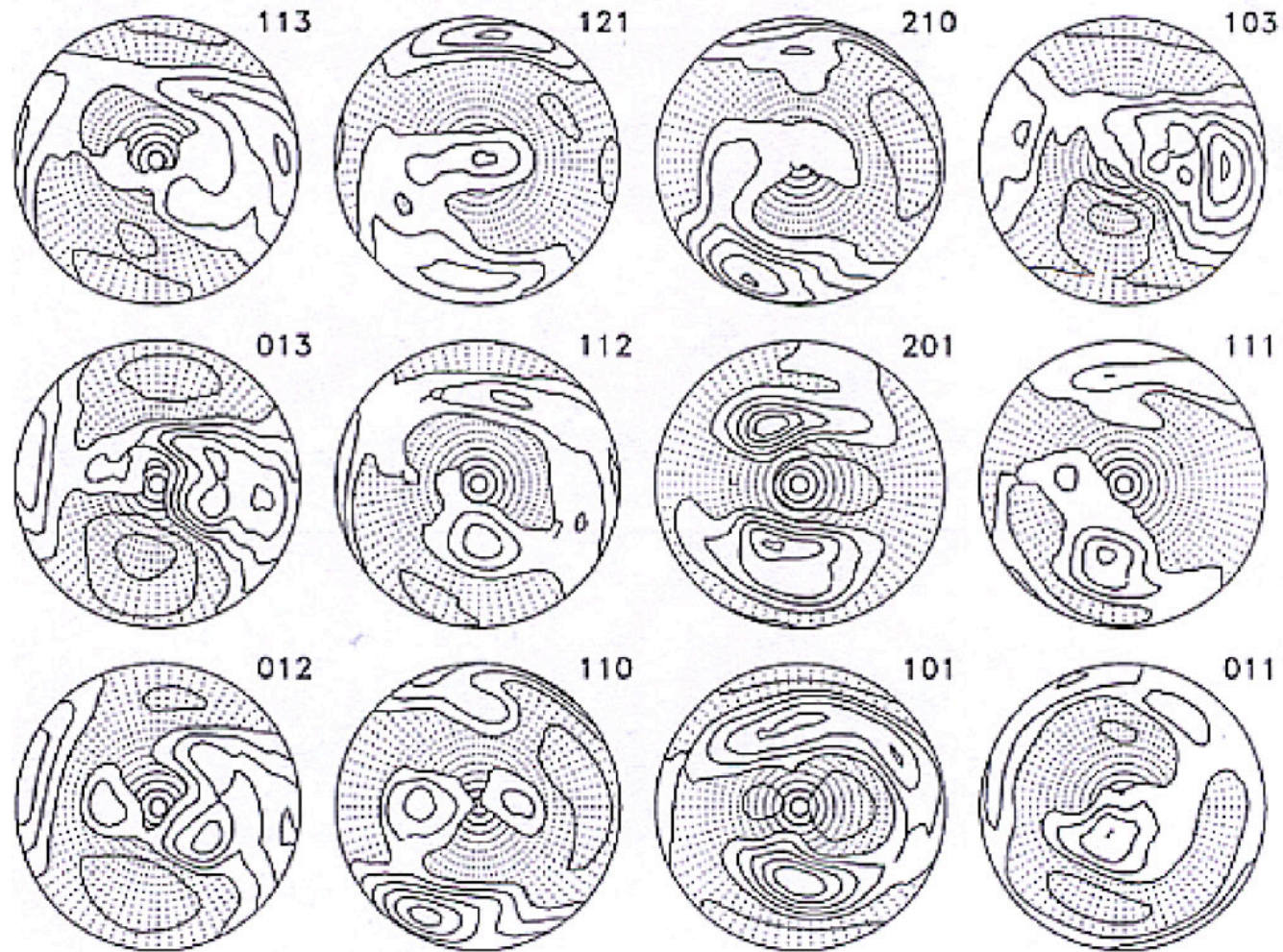
◆ Analysis:

- Analysed range of 0.5-3.5 Angstrom (527 reflections)
- Only 301 spectra used (to reduce memory consumption)
- Only reflections stronger than 10 % (and 5 %) of the strongest were used for texture analysis corresponding to 37 reflections (62).
- Crystal structure of α -Quartz assumed

Quartzite TOF spectra fitted (some)



Sigma section of the quartzite ODF



Quartzite results

- ◆ Using 62 peaks instead of 37 for texture analysis did not show remarkable improvements
- ◆ Agreement between the ODF so determined and the optical measurements
- ◆ Crystal structure refinement

Space Group	a [Angstrom]	c [Angstrom]	Si (x,x,0)	B _{Si} [Angstrom ²]	O (x,y,z)	B _O [Angstrom ²]
P3 ₂ 21	4.91393(5)	5.40394(9)	0.46323(7)	0.4(2)	0.41047(5) 0.26474(5) 0.78471(3)	0.7(1)